

NAVIGATION.

STAGE OF WATER IN RIVERS.

In the following table are shown the danger points in the rivers at the various stations, the highest and lowest depths for November, 1884, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, November, 1884.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.	
		Date.	Height.	Date.	Height.		
<i>Red River:</i>	<i>Ft. In.</i>		<i>Ft. In.</i>		<i>Ft. In.</i>	<i>Ft. In.</i>	
Shreveport, Louisiana.....	29 9	9 to 13	4 8	1	0 10	3 10	
<i>Arkansas:</i>							
Little Rock, Arkansas.....	23 0	30	9 0	20	3 3	5 9	
Fort Smith, Arkansas.....	15 0	28	2 0	16	4 9	6 9	
<i>Missouri:</i>							
Yankton, Dakota.....	24 0	1	8 2	22 to 30	6 1	2 1	
Omaha, Nebraska.....	18 0	1 to 7	6 11	27	4 7	2 4	
Leavenworth, Kansas.....	20 0	1 to 4	7 7	30	5 0	2 7	
<i>Mississippi:</i>							
Saint Paul, Minnesota.....	14 6	1, 2, 3	5 3	23	2 4	2 11	
La Crosse, Wisconsin.....	24 0	2, 3, 4	5 5	25	2 9	2 8	
Dubuque, Iowa.....	10 0	1, 2, 8	8 9	30	3 5	5 4	
Davenport, Iowa.....	15 0	1	7 2	30	3 2	4 0	
Keokuk, Iowa.....	14 0	1	8 5	30	4 1	4 4	
Saint Louis, Missouri.....	32 0	1	16 11	22	10 8	6 3	
Calro, Illinois.....	40 0	1	15 11	25	9 5	6 0	
Memphis, Tennessee.....	34 0	1	10 7	26, 27	5 3	5 4	
Vicksburg, Mississippi.....	41 0	4	14 1	30	5 8	8 5	
New Orleans, Louisiana.....	-3 0	1	-11 10	21	-13 2	1 4	
<i>Ohio:</i>							
Pittsburg, Pennsylvania.....	22 0	1	3 1	20 to 25	1 0	2 0	
Cincinnati, Ohio.....	50 0	9	6 1	1 to 5	3 0	3 1	
Louisville, Kentucky.....	25 0	11, 12	3 11	8 9	2 9	1 2	
<i>Cumberland:</i>							
Nashville, Tennessee.....	40 0	8, 9	1 5	21 22	0 5	1 0	
<i>Tennessee:</i>							
Chattanooga, Tennessee.....	33 0	27 29	1 10	17	0 7	1 3	
<i>Monongahela:</i>							
Pittsburg, Pennsylvania.....	29 0	1	3 0	20 to 25	1 0	2 0	
<i>Savannah:</i>							
Augusta, Georgia.....	32 0	25	7 0	9	4 8	2 4	
<i>Willamette:</i>							
Portland, Oregon.....		6, 7	5 4	29	1 6	3 10	
<i>Sacramento:</i>							
Red Bluff, California.....		1 to 30	0 11	1 to 30	0 11	0 0	
Sacramento, California.....		21, 22, 23	8 0	24 to 30	7 10	0 2	
<i>Mobile:</i>							
Mobile, Alabama.....		1, 2	16 6	7	14 4	2 2	
<i>Colorado:</i>							
Yuma, Arizona.....		4	15 10	30	14 1	1 9	

‡ Below bench mark. † Below high-water mark of 1874 and 1883.
* River frozen from 24th to 30th. ‡ River frozen from 27th to 30th.

At Chattanooga the lowest stage of water in the Tennessee river was attained on the 17th, when the depth was seven inches above low-water mark, or several inches lower than has been known at this season for several years; the highest stage of water was observed on the 27th and 29th, when the depth was one foot and ten inches above low-water mark.

The Cumberland river at Nashville was not navigable at any time during the month.

ICE IN RIVERS AND HARBORS.

Penobscot river.—Bangor, Maine: ice formed along the shores of the river on the 16th; during the night of the 18–19th the river froze over, but the ice was broken up by the tides during the day.

Hudson river.—Albany, New York: floating ice on the 21st.

Lake Erie.—Sandusky, Ohio: navigation for the season was practically closed on the 29th. The steamer "Jay Cooke" made her last trip to the islands on this date.

Maumee bay and river.—Toledo, Ohio: floating ice in river on the 27th, and in the bay on the 29th.

Rock river.—Rockford, Winnebago county, Illinois: river partially frozen on 24th; and on the 30th it was entirely closed.

Ontonagon river.—Ontonagon, Michigan: on the 24th teams crossed the river on the ice.

Lake Superior.—Duluth, Minnesota: during the night of the 22–23d Duluth and Superior bays froze over. The temperature fell to -17° on the 24th, when the ice was from six to seven inches thick. The barge "George Spencer" left for the lower lakes on the 25th, being the last departure of the season.

Milwaukee river.—Milwaukee, Wisconsin: the river froze over on the 25th.

Red river of the north.—Saint Vincent, Minnesota: the river froze over during the night of the 16–17th, but the ice broke up on the afternoon of the day following; the river froze over again on the 22d, closing navigation for the season.

Devil's Lake.—Fort Totten, Dakota: Fort Totten bay was covered with thin ice on the 2d; the lake froze over on the 17th, closing navigation for the season; on the 19th, the high northwesterly winds broke up the ice in the body of the lake, and heaped it along the shores, in some places, to depths of several feet.

Mississippi river.—Saint Paul, Minnesota: the last steamer of the season to leave this port, departed for Saint Louis on the 12th; floating ice in river, and the first permanent ice formed along the shores, on the 20th; floating ice continued on the 21st, 22d, and 23d; at 11 a. m. on the 24th, an ice dam formed, and by noon, the river was covered with ice as far as could be observed.

La Crosse, Wisconsin: floating ice from 23d to 26th; river froze over on the 27th; persons crossed the river on the ice on 28th; the last boat of the season left on the 23d.

Dubuque, Iowa: floating ice in river from 24th to 30th; all boats were laid up for the winter and navigation closed for the season on the 21st.

Davenport, Iowa: floating ice in river from 25th to 30th; the steamer "Wes Rambo" passed northward on the 22d, being the last boat of the season.

Muscatine, Muscatine county, Iowa: the first floating ice in river was observed on 25th.

Keokuk, Iowa: light floating ice in river on 28th and 30th; navigation was closed for the season on the latter date.

Missouri river.—Fort Yates, Dakota: floating ice in river on the 4th, 5th, 6th, 18th, 19th, 21st, 22d; the river froze over during the night of the 22–23d.

Fort Sully, Dakota: floating ice on the 5th and 6th; the river froze over during the night of the 17–18th; the high winds on the 19th broke up the ice; river froze again on the 20th; ice moved out of river on the 24th.

Fort Bennett, Dakota: floating ice on the 21st.

Maquoketa river.—Monticello, Jones county, Iowa: river froze over on the 24th.

MISCELLANEOUS.

Fort Bridger, Wyoming: considerable "anchor ice" was observed in Black's Fork of Green river on the morning of the 9th.

Edgington, Rock Island county, Illinois: at the close of the month the ground was frozen to a depth of six inches.

HIGH TIDES.

Eastport, Maine, 4th, 5th, 6th, 8th, 9th.

Narragansett Pier, Rhode Island, 19th.

New River Inlet, North Carolina, 5th, 9th, 10th.

LOW TIDES.

Eastport, Maine, 26th.

New River Inlet, North Carolina, 24th to 29th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for November, 1884, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 85.74 per cent. The percentages for the four elements are: Weather, 90.06; direction of the wind, 82.32; temperature, 82.82; barometer, 88.58 per cent. By geographical districts, they are: For New England, 86.90; middle Atlantic states, 86.53; south Atlantic states, 86.30; eastern Gulf states, 84.87; western Gulf states, 87.00; lower lake region, 85.53; upper lake region, 86.15; Ohio valley and Tennessee, 88.30; upper Mississippi valley, 84.97; Missouri valley, 79.66; north Pacific coast region, 81.25; middle Pacific coast region, 90.83; south Pacific coast region, 91.67. There were eleven omissions to predict out of 3,252, or 0.34 per cent. Of the 3,241 predictions that have been made, seventy-six, or 2.34